A1250-1

APRIL 16, 1990
CHEMICAL & ENGINEERING
NEWS

# Eastern Europe

U.S., others offer aid to clean up fouled environment
Page 7

A1250-1

CHEMICAL & ENGINEERING
NEWS
APRIL 16, 1990

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*Cover:* View of Copsa Mica, Romania. Photo by Anthony Suau/Black Star

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# LETTERS

## CHEMICAL SAFETY

### Titanium metal explosion

SIR: In the course of a silver recovery operation, a dark-colored sludge—later found to consist primarily of titanium metal flake—was settled, separated, and drained from a spent nitric acid stripping solution containing about 12% by weight of silver nitrate. Before drying was complete, a violent explosion occurred. A plant workman, the only person within visual range, was killed instantly. Although there was no apparent reason for him to have disturbed the tray at the time, the exact circumstances of initiation are not known. In addition to other damage, fragments propelled by the blast penetrated two nearby steel drums; the largest hole was about 6 inches in diameter. Partially dried sludge was widely distributed over a driveway, building walls, and rooftops. This material became sensitive as it dried and was repeatedly set off by the shoes and tools of cleanup workers.

Subsequent analysis and laboratory study demonstrated that the settled and drained titanium flake retained about 14 times its own weight of the silver nitrate solution, leading to a dried sludge containing about 60% by weight of silver nitrate and 40% by weight of titanium metal. Such compositions were found to explode vigorously upon heating or when subjected to friction or impact. The explosion reaction can be depicted as follows:

$$3Ti + 2AgNO_3 \rightarrow 3TiO_2 + 2Ag + N_2$$

For the balanced composition depicted above the standard heat of reaction, frequently a good approximation of the heat of explosion, is about 5 kilojoules per g, comparable to the heat of explosion of conventional high explosives.

This accident demonstrates that finely divided titanium metal can form extremely hazardous compositions when dispersed in a strong oxidant such as silver nitrate.

**E. S. Shanley**
*Arthur D. Little Inc.*

### Use of asbestos

SIR: The journal *Science* published a study of medical experts who found that the "asbestos panic" may be leading to costly and unnecessary removal efforts. We were brainwashed into believing that asbestos is a very dangerous carcinogen. Nobody can dispute the fact that asbestos is an odorless, nontoxic mineral that does not give up any vapors. It is also the best filtering material.

Those who condemn the use of asbestos do not recognize that the number of fire deaths has sharply increased since insulation containing those fibers has been removed from many buildings and is not installed any more. They also seem not to know that many of the materials that replaced asbestos are far more dangerous to our health than it was. The carbon monoxide, nicotine, nail polish, fumes emanating from some kinds of carpeting and insulation materials, etc. that are circulated with the cooled or heated air of totally climate-controlled buildings are thousands of times more harmful to our lungs than floating asbestos fibers. Asbestos is retained by the air filters.

The employees in the Environmental Protection Agency headquarters outside Washington, D.C., get sick from inhaling the chemicals emanating from the so-said safe wall and floor coverings. They have to go outside for extended periods to recover. Others had to take leaves of absence or could not return to work there.

If we are forced to spend more than $30 billion to remove asbestos from public and private buildings, we should assume that asbestos is a major cause of death in the U.S. A 1986 statistic of causes of death does not even list the 12,000 people who, according to EPA claims, die annually from asbestos-related causes.

All persons who work in areas filled with enormous amounts of dust are at risk to be afflicted with lung diseases. Coal miners, flour millers, bakers, etc. fall into this category. If ever a school teacher or student would have come

*Continued on page 41*

### Corrections

- April 2, page 10: The eighth company listed in the table should read Celgene, not Calgene. Footnote c in the table should read: Consolidated figures for the year to reflect merger with Plant Genetics in July 1989.
- April 2, page 25: Ted Halchak joins Celgene Corp., not Calgene, as manager of commercial development.

its development. Earlier this year, Jean-René Fourtou, chairman of the parent company, indicated that the Rorer Group acquisition will be the last major buy for Rhône-Poulenc for some time. This means that Rhône-Poulenc Inc., while there may be further smaller acquisitions, will be switching from the acquisitions strategy that it had to have in the 1980s to grow as fast as it did, to an internal growth strategy.

Neff agrees that the company is embarking on a new phase. And it is evidenced in a number of ways, mainly in the methods of achieving internal growth. He indicates that strategic premiums can be garnered from the acquisitions by the synergies that may be inherent between them, by increasing revenues, and by lowering costs. For agricultural chemicals, although there was some cost cutting, the major emphasis has been on increasing sales through expanded markets and new formulations. For basic chemicals, the main focus has been on cost cutting.

With many of the new specialty-oriented acquisitions, there will be efforts to decrease costs, but the main thrust will be on building sales. "I don't think that these businesses were managed on a worldwide basis," Neff says.

The firm will get a chance to see what it can do worldwide. In the future, four of its businesses will be managed from the U.S. These are surfactants, food ingredients, recycle and recovery of chemical wastes, and seeds. Previously, these units were run from France.

Just as the management of some worldwide businesses is being switched to the U.S., so is technical support and R&D for some business units. It is almost axiomatic that when foreign-owned companies reach some critical mass, it is difficult for the parent to do all the R&D and impose it on the subsidiary. Rhône-Poulenc Inc. seems to be approaching that stage. In basic chemicals, the technology is still largely brought in from France. It is this technology that the firm is using in its wet-process phosphoric acid plant being built at Geismar, La.

But in other areas, such as insecticides, long a strong suit of the agrochemicals unit, R&D is done at its Research Triangle Park, N.C., facility. And technical work will be done in the U.S. for the four worldwide business units managed here. Also, Neff says, technical support for textiles and epoxies is done in the U.S. It is natural, he says, that Rhône-Poulenc will attempt to tap U.S. R&D in that the U.S. chemical industry leads in biotechnology, advanced materials, and some other chemically related areas.

Neff ticks off a number of goals that he has for the company:

- To be a diversified chemical company that is one of the top three participants in such businesses as agrochemicals, sulfur products, recycle and recovery of chemical wastes, food ingredients, and surfactants.
- To keep technology as a significant part of the product offering.
- To develop low-cost positions, where appropriate.
- To continue to represent at least 20% of Rhône-Poulenc Group's sales.

But with the change from an acquisitions strategy to one of internal growth, Neff has a further goal that is ambitious. He wants sales to double over the next 10 years. □

# Expansions delayed to ease ethylene overcapacity

The vast array of new ethylene capacity previously announced for startup between 1990 and 1992 is being reduced drastically, and companies are now extending the timing for expected startups to much further into the 1990s for many of the projects. The capacity additions were spawned by the surging demand for ethylene during 1988 and early 1989 and by soaring selling prices of the same period.

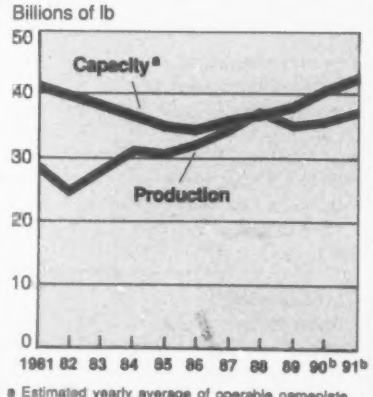
Those additions would have brought capacity to 50 billion lb per year by 1993. Demand for ethylene now looks as if it might reach 40 billion lb by 1993 if the U.S. economy stays at its current sluggish growth pace and if exports of derivatives decline no more than modestly. Obviously, overcapacity and pressure on prices could have become serious.

As a group, U.S. ethylene producers are exercising caution, according to Earl H. Armstrong, vice president of DeWitt & Co., speaking at the firm's annual Petrochemical Review in late March. The rush to expand capacity has slowed, easing concerns that another dismal era of low operating rates and marginal profitability, like that of the mid-1980s, would recur. Nevertheless, on-going capacity additions are slowing operating rates and putting pressure on prices, according to a number of industry sources at the National Petroleum Refiners Association's 15th Annual International Petrochemical Conference held in San Antonio early this month.

Nonetheless, several major capacity additions will be completed and started up by early 1991, along with some small expansions through process improvements. Quantum Chemical, scheduled to start up a 1.5 billion lb-per-year unit in the fourth quarter of this year, will have the first of the new large ethylene plants to be completed. That plant and another being built by Phillips 66 for startup in early 1991 will add 3 billion lb of capacity, nearly 8% of the present total.

Expansion projects completed in 1989, as well as other small additions recently completed or to be finished later this year, will add more than 2 billion lb to nameplate capacity or about half of the expan-

**Ethylene capacity additions have eased supply crunch**




a Estimated yearly average of operable nameplate capacity. b Forecast. **Sources:** U.S. International Trade Commission, National Petroleum Refiners Association, C&EN estimates

sion in demand this year. In-place and operable nameplate capacity in early March exceeded 40 billion lb, says John R. Hodson, who heads Hodson & Associates of Houston. He forecasts additions to capacity of more than 10 billion lb as either expansions or new additions.

This year, the additional capacity exceeding demand growth will lower the average operating rate to less than 90% of nameplate capacity. The ethylene industry's operating rate has not been below 90% of nameplate capacity since 1985.

Demand for ethylene in the U.S. this year is forecast to grow 3 to 4%, with similar growth expected in 1991. With that rate of increase next year, demand will reach 37.8 billion lb, exceeding the previous record of 37.4 billion lb in 1988.

Last year, consumption of ethylene fell 2 billion lb, as production of many kinds of plastic resins declined. Demand for plastics decreased less than production because inventories were reduced as selling prices decreased. The slowing in demand and the potential of a large increase in capacity also pushed down ethylene prices more than a third from the peak price of about 34 cents per lb. Ethylene inventories, as well, were reduced.

Both list and spot prices for ethylene firmed quickly following the unusually cold weather along the Gulf Coast in late December, during which many ethylene and derivatives units were damaged by equipment freeze-up. Consumers were caught with minimal inventories of derivatives. When the plants were repaired, they were operated at high rates to meet a surge in demand. Weather caused a loss of 1.1 billion lb of ethylene through February, estimates John S. Doerr, who heads International PC, a Houston consulting firm.

The lost ethylene and derivatives output was made up almost completely by the end of the first quarter this year. Spot prices for ethylene began to drop below the list price of 24 cents a lb in late March. Some further weakening may occur this quarter, but the declines will be much smaller than those occurring monthly during the second half of 1989.

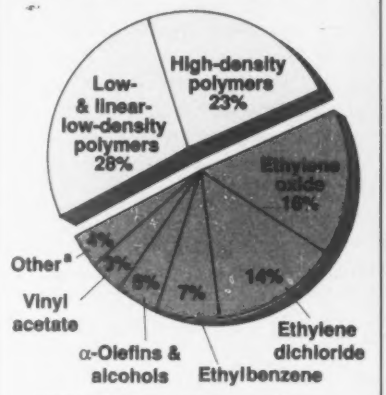
Because of lowered inventories of ethylene derivatives, particularly the polyethylenes, second-quarter demand is expected to approximate the first quarter, giving good demand for ethylene during the first half of 1990, says Doerr. The second half of 1990 is more uncertain. With nominal inventories in place, some producers say, U.S. production could increase because the economy is expected to grow modestly.

But prices could become a problem. For example, startup of more capacity to make polyethylenes could cause weakening of prices for these plastics. That could lead polymer producers to ask ethylene producers for lower prices.

Exports of derivatives will be a critical factor affecting ethylene demand this year, Doerr says. The net of exports over imports of these derivatives will be down slightly from the peak of last year, but will be equal to or better than the net of 1988. Strength in exports of derivatives will depend on the value of the dollar relative to other currencies, and on demand growth in other producing countries that will consume some derivatives that otherwise might be exported.

Polymers of ethylene and of second- or third-line derivatives (frequently containing other compounds) account for nearly 90% of consumption. A big fraction of the polymers go into consumer goods, most of which are nondurables. Until recently, population growth was the bottom limit for growth in the demand for these polymers. Markets captured from paper, metal, glass, wood, and other materials provided the larger growth rates. Now, however, the high visibility of plastics in

**Polymers account for most U.S. ethylene use**




1989 ethylene consumption = 35.4 billion lb

a Acetaldehyde, ethylene-propylene elastomers, ethanol, and the like, including inventory change, exports, and losses. Source: Petrocon Associates

**Expansions could raise ethylene capacity by 15 billion lb**

| Billions of lb | Expansion | Planned startup date | Status |
|---|---|---|---|
| Amoco Chemicals | 1.5 | 1993 | Deferred |
| Chevron Chemical | 0.2 | 1989 | 1990 |
| Dow Chemical | 1.5 | 1992 | On schedule |
| Exxon Chemical | 1.0 | 1990 | On schedule |
| Formosa Chemical | 1.5 | 1992 | Uncertain |
| Lyondell Petrochemical | 0.6 | 1989 | Done |
| Mobil Chemical | 1.0 | Uncertain | Not developed |
| Oxy Chemical | 1.0 | 1993 or later | Deferred |
| Phillips 66 | 1.5 | 1991 | On schedule |
| Quantum Chemical | 1.5 | 1990 late | On schedule |
| Shell Chemical | 1.0 | 1990-91 | On schedule |
| Texaco[a] | 0.4 | 1989 | Done |
| Union Carbide[a] | 0.5 | 1989 | Done |
| Union Texas | 0.4 | 1990 | Done |
| Vista Chemical | 0.4 | 1990 | On schedule |
| Westlake Polymers | 1.0 | 1991 | On schedule |
| TOTAL | 15.0 | | |

a Restarted existing plant. Source: DeWitt & Co.

the solid waste stream is bringing a surge of recycling efforts. In the future, if recycling proves to be economical, then cuts in demand for new polymers could slow demand for ethylene. Recycling's impact on demand and selling prices of ethylene could spur efforts to export more derivatives and could put more pressure on prices.

Growth in ethylene use in derivatives will vary widely. However, the dominance of polyethylenes, at more than 50% of ethylene consumption, puts them in control of the outlook for ethylene. Unless exports continue to grow much faster than the current forecast of a return to modest rate increases, polyethylene demand growth will average about 3 to 4% annually over the next five years. As industry sources point out, this growth will consume much of the output from capacity additions to be distributed over the same period.

Ethylene dichloride, most of which becomes polyvinyl chloride, could grow in demand for ethylene at above 4% annually, faster than demand in polyethylene will grow. Continued low prices for chlorine will help the competitive position of PVC. Because of their uses in detergent materials, $\alpha$-olefins also are forecast to have a higher growth rate than polyethylenes. $\alpha$-Olefins are growing rather rapidly in use as a comonomer for polyethylenes, but this use has an insignificant effect on ethylene demand. Together, the two uses account for less than 20% of ethylene demand. Other uses of ethylene, such as ethylene oxide and ethylbenzene, are expected to grow more slowly than the average 3% annually.

Some ethylene derivative makers building new plants or expanding existing plants are expected to reduce purchases of ethylene after the current round of plant expansions is completed. As a result, merchant demand for ethylene will decline about 2 billion lb, or about 5%, industry forecasters say. Merchant producers will seek out new markets for this ethylene. Although the quantity is small, selling it could have a negative effect on margins if marketers choose to lower prices.

*Bruce Greek*

# U.K. chemical industry to boost capital spending

Despite a slowdown in the general economy that began late last year, the U.K. chemical industry nonetheless expects to boost its capital spending 9% in real terms over 1989. That's the prediction of the latest annual investment intentions survey undertaken by the U.K. Chemical Industries Association (CIA).

Capital spending for the year will be about $3.94 billion, the association predicts, even after it has factored in an automatic 10% decrease, for the first year in the rolling three-year survey, to correct for overoptimism. The prediction follows shortly after another survey by CIA, earlier this year, that production in the U.K. chemical industry would grow only 1% this year over 1989, a slowdown from 1989's 4% increase over 1988. In Western Europe as a whole, this year's output is expected to increase 2% over last year, which in turn was up 3% over 1988.

During the next three years, the survey indicates, total fixed capital spending—that is, spending on plant, machinery, vehicles, and buildings—will be about $12.2 billion, about $1.6 billion more than reported last year. The amount predicted for capital spending in 1991, for example, shows another 12% increase, to $4.42 billion, dropping off in 1992 to about the same level as that of this year.

Nearly half of total capital spending will go to build new plants and to expand existing units—29% on new facilities and 17% to expansions of existing plants. Another 34% will be spent on replacement of or modification to existing facilities, and some 14% to R&D facilities. Although nearly one third of the spending is designated for new production capacity or expansions, the emphasis in this year's survey, the 25th annual one, shows a slight shift toward replacement.

Spending on petrochemicals is the most rapidly rising product area, followed by pharmaceuticals. Together, the two sectors account for 83% of the real increase in planned spending over the three-year period.

The survey also points out that spending on health, safety, and environmental protection measures is continuing to rise. In fact, CIA estimates that such measures now make up 16% of total capital spending.

*Patricia Layman*

# Polypropylene demand signals good year

Montedison, the Italian chemical company that owns, among other interests, polypropylene producer Himont, says that polypropylene is off to "a strong start" in 1990, after a positive year in 1989.

Analysis by Montedison's economic research department indicates significant sales increases in all the industrialized nations for polypropylene. Demand last year in the European Community as a whole increased 9% over 1988, but in the U.S., domestic sales of the polymer were up only about 3% over 1988.

All the industrialized nations of the EC showed increases, with the highest coming from France, up 9% over 1988; Italy, up 12%; the U.K., up 6%; West Germany, up 4%; and the Netherlands, up 23%.

According to Montedison, the figures indicate that the most important consuming markets are in a phase marked by a significant positive trend—noteworthy considering that 1988 itself had been considered to be exceptionally good.

Moreover, if one accepts the argument that polypropylene sales are an efficient and sensitive leading indicator of general trends in the overall economy, the figures give an encouraging outlook for 1990. Lower growth rates than those experienced in the 1987–88 period seem to be in store, the company concludes, but the probability of a recession seems to be ruled out. January 1990 sales seem to bear that conclusion out: In the EC as a whole, January demand for polypropylene grew on average 16% over the same month in 1989. Similarly, in the U.S., demand in January grew 8% over that in January 1989, in turn up 7% over January 1988.

*Patricia Layman*